

U.S. Pat App. No. 10/816,211
Amendment A in response to
Office Action mailed 5/17/2006
Page 2
Atty Dkt No. LMRX-P034/P1233

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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1-38. (Cancelled)

39. (New) A method for determining a status of a component of a plasma processing system comprising:

identifying a set of variables, the set of variables including at least one parameter of the component, the at least one parameter of the component pertaining to the status of the component;

formulating an impedance as a function of the set of variables;

operating the plasma processing system using a plurality of signals associated with different frequencies, at least two of the plurality of signals being provided to the plasma processing system at different times;

measuring a set of voltage values and a set of current values associated with at least one of an upper electrode and a lower electrode of the plasma processing system for the plurality of signals;

calculating a set of values of the impedance using the set of voltage values and the set of current values;

forming a set of equations using the function and the set of values of the impedance; and

solving the set of equations to obtain a value of the at least one parameter of the component, the value of the at least one parameter of the component reflecting the status of the component.

40. (New) The method of claim 1 further comprising:

providing a range for the at least one parameter of the component; and

U.S. Pat App. No. 10/816,211
Amendment A in response to
Office Action mailed 5/17/2006
Page 3
Atty Dkt No. LMRX-P034/P1233

comparing the value of the at least one parameter of the component with the range.

41. (New) The method of claim 1 wherein the component comprises an electrode.
42. (New) The method of claim 1 wherein the component comprises a lower electrode, the lower electrode configured to support a substrate for processing in the plasma processing system.
43. (New) The method of claim 1 wherein the at least one parameter of the component includes a capacitance.
44. (New) The method of claim 1 wherein the at least one parameter of the component includes a resistance.
45. (New) The method of claim 1 wherein the at least one parameter of the component includes an inductance.
46. (New) The method of claim 1 wherein the at least one of the upper electrode and the lower electrode is both of the upper electrode and the lower electrode.
47. (New) The method of claim 1 wherein the set of variables includes at least one electrical property of a device for generating the plurality of signals, the at least one electrical property including at least one of a capacitance, a resistance, and an inductance.
48. (New) The method of claim 1 wherein the set of variables includes at least one electrical property of a device for measuring the set of voltage values and the set of current values, the at least one electrical property including at least one of a capacitance, a resistance, and an inductance.

U.S. Pat App. No. 10/816,211
Amendment A in response to
Office Action mailed 5/17/2006
Page 4
Atty Dkt No. LMRX-P034/P1233

49. (New) The method of claim 1 wherein the number of equations in the set of equations is equal to the number of unmeasured variables variable in the set of variable, the unmeasured variables being not measured directly.

50. (New) A plasma processing system comprising:

a monitored component;

a signal generator configured to generate a plurality of signals associated with different frequencies, at least two of the plurality of signals being provided to the plasma processing system at different times;

an electrical measuring device configured to measure a set of voltage values and a set of current values associated with at least one of an upper electrode and a lower electrode of the plasma processing system for the plurality of signals; and

at least one computer device configured to: (a) store a mathematical relation between an impedance and a set of variables, the set of variables including at least one parameter of the monitored component, (b) calculate a set of values of the impedance using the set of voltage values and the set of current values, and (c) calculate a value of the at least one parameter of the monitored component using the mathematical relation and the set of values of the impedance.

51. (New) The plasma processing system of claim 49 wherein the at least one computing device is further configured to:

store a range; and

compare the value of the at least one parameter of the monitored component with the range.

52. (New) The method of claim 1 wherein the monitored component comprises an electrode.

U.S. Pat App. No. 10/816,211
Amendment A in response to
Office Action mailed 5/17/2006
Page 5
Atty Dkt No. LMRX-P034/P1233

53. (New) The method of claim 1 wherein the monitored component comprises a lower electrode, the lower electrode configured to support a substrate for processing in the plasma processing system.
54. (New) The method of claim 1 wherein the at least one parameter of the monitored component includes a capacitance.
55. (New) The method of claim 1 wherein the at least one parameter of the monitored component includes a resistance.
56. (New) The method of claim 1 wherein the at least one parameter of the monitored component includes an inductance.
57. (New) The method of claim 1 wherein the at least one of the upper electrode and the lower electrode is both of the upper electrode and the lower electrode.
58. (New) The method of claim 1 wherein the set of variables includes at least one electrical property of the signal generator.
59. (New) The method of claim 1 wherein the set of variables includes at least one electrical property of the electrical measuring device.